Claims

1. A method of testing a path formed in a layer of thin film material for use in a superconducting coil, the layer provided on a former having a substantially curved surface, the method comprising the step of scanning the layer to detect defects in the layer.

2. A method as claimed in claim 1, wherein the former defines a substantially right circular cylindrical surface and the coil path defines a substantially spiral track about the former.

3. A method as claimed in any one of the preceding claims, wherein the scanning step comprises at least one probing step, for probing a physical property of the material comprising the layer, the or each probing step being carried out without the coil path being defined in the layer.

4. A method as claimed in claim 3, wherein the scanning step comprises a plurality of probing steps, a different physical property of said material being probed during each probing step.

5. A method as claimed in claim 3 or claim 4, wherein the or each probing step provides a data set of a physical property of the layer, each data set being processable to form a respective map, having features indicating variations in the respective physical property over the layer.

6. A method as claimed in claim 5, wherein each map is combined with one or more of the other maps to provide a composite map.

7. A method as claimed in claim 6, wherein each map is weighted relative to each other map when combined to provide the composite map.

8. A method as claimed in any one of claims 5 to 7, wherein the features of each map (including the composite map) are analysed to identify and locate defects in the layer.

9. A method as claimed in claim 8, wherein the method further comprises the steps of:

a) identifying whether each defect is a repairable defect; and

b) repairing each repairable defect.

10. A method as claimed in claim 8 or claim 9, wherein the method further comprises the steps of:

a) identifying whether each defect is irreparable; and

b) calculating the coil path that avoids the irreparable defect(s); and

c) writing or patterning the path in the layer to define the path of a coil track.

11. A method as claimed in claim 10, wherein the step of calculating the coil path comprises the step of adapting the path of the coil track such that the coil track produces a magnetic field that is predetermined.

12. A method as claimed in claim 11, wherein the step of adapting the coil path to rectify the shape of the field produced by the coil track also accounts for each field produced by each other existing coil track that comprises the coil.

13. A method as claimed in claim 11 or claim 12, wherein the step of adapting the coil path to rectify the shape of the field produced by the coil track also accounts for each field external to the coil.

14. A method as claimed in any one of claims 8 to 13, wherein the layer is a thin film of superconducting material and the method further comprises the step of abandoning each part of the layer, where that part comprises too many defects to be repairable or avoidable, or where it would be easier to abandon than repair or avoid.

15. A method as claimed in any one of claims 1 to 14, wherein the layer is a thin film of super-conducting material step of scanning comprises a step of testing whether the coil path formed in the layer, defining a coil track that superconducts.

16. A method as claimed in claim 15, wherein the coil track is tested, by means of a binary search method, to locate a part of the coil track that does not have predetermined superconducting properties.

17. A method as claimed in claim 16, wherein the binary search method uses contact brushes which are moved in an iterative procedure to locate the or each defective area.

18. A method as claimed in claim 16, wherein the binary search method a probe, to perturb the superconductive properties locally.

19. A method as claimed in claim 15, wherein the coil track is tested, by means of a probe spot method, to locate a part of the coil track that does not have predetermined superconducting properties.

20. A method as claimed in claim 15, wherein the coil track is tested, by means of a dynamic testing technique, to locate a part of the coil track that is non-superconductive, the dynamic testing technique being dependent on at least one dynamic variable.

21. A method as claimed in claim 20, wherein at least one of the dynamic variables is the speed of rotation of the former divided by the probe repetition frequency.

22. A method as claimed in any one of claims 15 to 21, wherein the step of testing whether the coil track superconducts produces a result which is portrayable as a map of the coil track, the map indicating each part of the of the coil track that has poor superconducting properties and the location of the or each part on the coil track.

23. A method as claimed in claim 22, wherein a part of the coil track that has poor superconducting properties is abandoned.

24. A method as claimed in claim 22 or 23, wherein a part of the track that has poor superconducting properties is repaired.

25. A method as claimed in claim 23 or 24, wherein those parts of the coil track that are not abandoned are connected by way of at least one interconnection.

26. A method as claimed in any one of claims 1 to 14, wherein the layer is a buffer layer or a metallisation layer.

27. A method as claimed in claim 26, wherein the coil track is formed in a subsequent layer.

28. Apparatus for testing a path formed in a thin film material for use in a super-conducting coil, the apparatus being arranged to carry out the method as claimed in any one of claims 1 to 27.

29. A method of fabricating a path formed in a layer of thin film material for use in a super-conducting coil, the layer provided on a former having a substantially curved surface, the method comprising the following steps:

a) depositing, shaping and texturing the material comprising the layer to form the path, in situ, on, or in, the surface of the former; and

b) testing the coil track as claimed in claims 1 to 27.

30. Apparatus for testing a path, the path being formed in a layer of thin film material for use in a superconducting coil, the layer provided on a former having a substantially curved surface, the path thereby defining a coil track, the apparatus comprising:

a) a scanner for scanning the layer;

b) a memory for storing information; and

c) a processor connected to the memory and the scanner, the processor being arranged to receive the signal received from the scanner, to process the signal extracting information from the signal, and to direct the information to the memory.

31. Apparatus as claimed in claim 30, wherein the scanner comprises at least one probe for probing a physical characteristic of the material, the or each probe being controllable by the processor for sending a signal to the processor, the processor identifying and locating each defect in the layer to provide a map of the defect(s) present in the layer, and the processor storing the map in the memory.

32. Apparatus as claimed in claim 31, further comprising a repairer, the repairer being controllable by the processor, the processor identifying those defects that are repairable, and the repairer being arranged to repair the reparable defects.

33. Apparatus as claimed in claim 31 or claim 32, further comprising a coil writer, the coil writer being controllable by the processor, the processor identifying those defects that are irreparable, the processor calculating a coil path that avoids the irreparable defects, and the coil writer being arranged to write, pattern or otherwise define a coil path into the layer, defining a coil track that superconducts.

34. Apparatus as claimed in any one of claims 30 to 33, wherein the layer is a thin film of superconducting material and the scanner comprises a coil tester, the coil tester being controllable by the processor, and the coil tester being arranged to locate weakly superconducting areas of the coil track by using a probe test or an electrical test or a combination of both

35 Apparatus as claimed in any one of claims 30 to 33, wherein the layer is a buffer layer or a metallisation layer.

36. Apparatus for fabricating a path formed in a layer of thin film material for use in a superconducting coil, the layer provided on a former having a substantially curved surface, the apparatus comprising:

a) a deposition device being arranged to deposit,

shape and texture the layer, in situ, on the surface of the former; and

b) apparatus being arranged for testing the layer, the apparatus being claimed in any one of claims 30 to 35.

5

37. A device fabricated by way of a method, the method as claimed in any one of claims 1 to 27.